



Deatrick & Associates – Chlor-Floc® Water Purification Tablets

NSN 6850-01-352-6129

Device Information

Military issue Chlor-Floc water purification tablets are used for treating individual water supplies. Chlor-Floc tablets contain flocculating agents (e.g., aluminum sulfate) to clarify the water and sodium dichloroisocyanurate, a form of chlorine, to provide disinfection. Chlor-Floc is manufactured by the Control Chemical Company in South Africa and distributed in the United States by Deatrick and Associates. This device comes with 30 tablets, 1 plastic bag, and 3 filter pouches. Directions call for the user to fill the plastic bag with 1L of water, add 1 tablet, close and shake bag until tablet dissolves, then swirl the bag for 10 seconds. Let the bag sit for 4 minutes, swirl again for 10 seconds, then let the bag sit an additional 15 minutes. After 15 minutes pour the water through one of the filter pouches and into a separate container (i.e., a canteen) taking care not to pour the sediment into the filter pouch. Rinse the sediment from the plastic bag and save bag for future treatment. Depending on the temperature of the water being treated 1 or 2 tablets are added. Waters warmer than 5° C require only 1 tablet while waters 5° C or colder require 2 tablets. In all cases the wait time is approximately 20 minutes (4-minute and 15-minute wait times), except when treating warmer waters (25° C) when only a total of approximately 12 minutes is required (4-minute and 7-minute wait times). The filter pouches can be reused if cleaned thoroughly with treated water. The user should always be sure to use the same side of the filter pouch for straining. The tablets should be stored in their sealed tablet wrappers away from excessive heat or direct sunlight.

Effectiveness Against Microbial Pathogens

Independent testing using the U.S. Environmental Protection Agency (USEPA) Guide Standard and Protocol for Testing Microbiological Water Purifiers confirms this product met the minimum 6-, 4-, and 3-log reduction requirements for bacteria, viruses and *Giardia* cysts (respectively) when used according to directions (references 1-3). This testing also showed that Chlor-Floc did not adequately provide a minimum 3-log *Cryptosporidium* oocysts reduction. Using Chlor-Floc according to directions results in a disinfectant concentration times contact time (CT) of 96 mg-min/L for 25° C waters and warmer, 160 mg-min/L for 6-24° C waters, and 320 mg-min/L for 5° C and colder waters. Additional treatment such as filtration through a

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1 micron absolute filter is necessary for the adequate removal of *Cryptosporidium* oocysts. Providing additional wait time when using Chlor-Floc for chlorine disinfection will not likely provide adequate *Cryptosporidium* reduction in a reasonable amount of time. Although test data showed 0.7 – 2.7-log reduction of *Cryptosporidium*, the reduction was due to the physical removal of the oocysts by the flocculation and sedimentation process. Chlorine disinfection provided negligible *Cryptosporidium* reduction at the prescribed wait time of 20 minutes. Based on independent data testing the device under sever conditions required by the USEPA protocol, Chlor-Floc is given three √s for effectiveness against bacteria, viruses, and *Giardia* cysts, and an X for effectiveness against *Cryptosporidium* oocysts (for an explanation of the rating checks [click here](#)). The following table summarizes Chlor-Floc's expected performance, evaluation rating, and the mechanism by which pathogens are inactivated:

Table. Expected Performance Against Microbial Pathogens When Used As Directed.

Microbial Pathogen Type	Expected Performance	Evaluation Rating	Reduction Mechanism
Bacteria	6-log	√√√	Flocculation/sedimentation & disinfection
Viruses	4-log	√√√	Flocculation/sedimentation & disinfection
<i>Giardia</i> cysts	3-log	√√√	Flocculation/sedimentation & disinfection
<i>Cryptosporidium</i> oocysts	Not Effective	X	-

Production Capacity

One package of Chlor-Floc treats 15-30 liters depending on water temperature.

Cleaning, Replacement, End of Life Indicator, Shelf Life

The shelf life of Chlor-Floc is 3 years from the date of manufacture.

Weight and Size

The weight of the entire Chlor-Floc package (plastic bag, tablets, and filter pouches) is approximately 80 grams. The approximate dimensions of the Chlor-Floc package are 18 cm (L) x 8 cm (W) x 2 cm (H).



Cost

The National Stock Number (NSN) for Chlor-Floc is NSN 6850-01-352-6129. The cost is \$12.79 per package (30 tablets, 1 plastic bag, and 3 filter pouches).

Device Evaluation

Independent testing using the USEPA Guide Standard and Protocol for Testing Microbiological Water Purifiers confirms Chlor-Floc met the minimum 6-log, 4-log, and 3-log reduction requirements for bacteria, viruses, and *Giardia* cysts, respectively (references 1-3). The testing also showed that Chlor-Floc did not meet the minimum 3-log *Cryptosporidium* oocysts reduction requirement when used as directed. Additional treatment to reduce *Cryptosporidium* is necessary, such as using a 1-micron absolute pore size filter. Water temperature can't often be measured in the field and requires user subjectivity. In situations where temperature cannot be determined, the user should take a conservative approach and treat water according to the directions for treating 5° C or colder waters. Chlor-Floc, when used as directed, will reduce the cloudiness/turbidity of the water. Test data indicate turbidity reduction increases with increasing water temperature and increasing turbidity of the water being treated due to the physical and chemical properties of the flocculating agents. Compared to disinfectant only devices, Chlor-Floc is more complicated to use. When used as directed, Chlor-Floc will expose the user to chlorine and cyanuric acid (due to the use of sodium dichloroisocyanurate) and may expose the user to disinfection byproducts such as trihalomethanes and haloacetic acids when chlorine reacts with naturally present organic matter. However, when used as directed for short periods of time, exposure to these compounds is not expected to cause adverse health effects in healthy adults (reference 4). Use of this device may impart a chlorine taste or smell to the water.

Advantages

- Expect consistent protection from bacteria, viruses, and *Giardia* cysts when used as directed.
- Small and lightweight.
- Reduces cloudiness/turbidity.
- Fairly simple to use.
- No adverse health effects expected in healthy adults.

Disadvantages

- Not effective against *Cryptosporidium*. Additional treatment is necessary.
- Can impart taste and odor.
- Requires user subjectivity with respect to evaluating water temperature.



References

1. USEPA, Registration Division Office of Pesticide Program, Criteria and Standards Division Office of Drinking Water, 1987. *Guide Standard and Protocol for Testing Microbiological Water Purifiers*. Washington, D.C.
2. U.S. Army Natick Research, Development, and Engineering Center, 1993. *Efficacy of Flocculating and Other Emergency Water Purification Tablets*. (NATICK/TR-93/033). Natick, MA. Prepared by Powers, E.M.
3. U.S. Army Biomedical Research & Development Laboratory, 1992. *Evaluation of the Military Effectiveness of Chlor-Floc Water Purification Tablets for Treatment of Waterborne Micro-Organisms*. (Technical Report 9205). Fort Detrick, MD. Prepared by Schaub, S.A. et al.
4. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Chlorine Disinfection in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.

